Effort Estimation in Puget Sound Washington Using an Angler-based Survey Approach
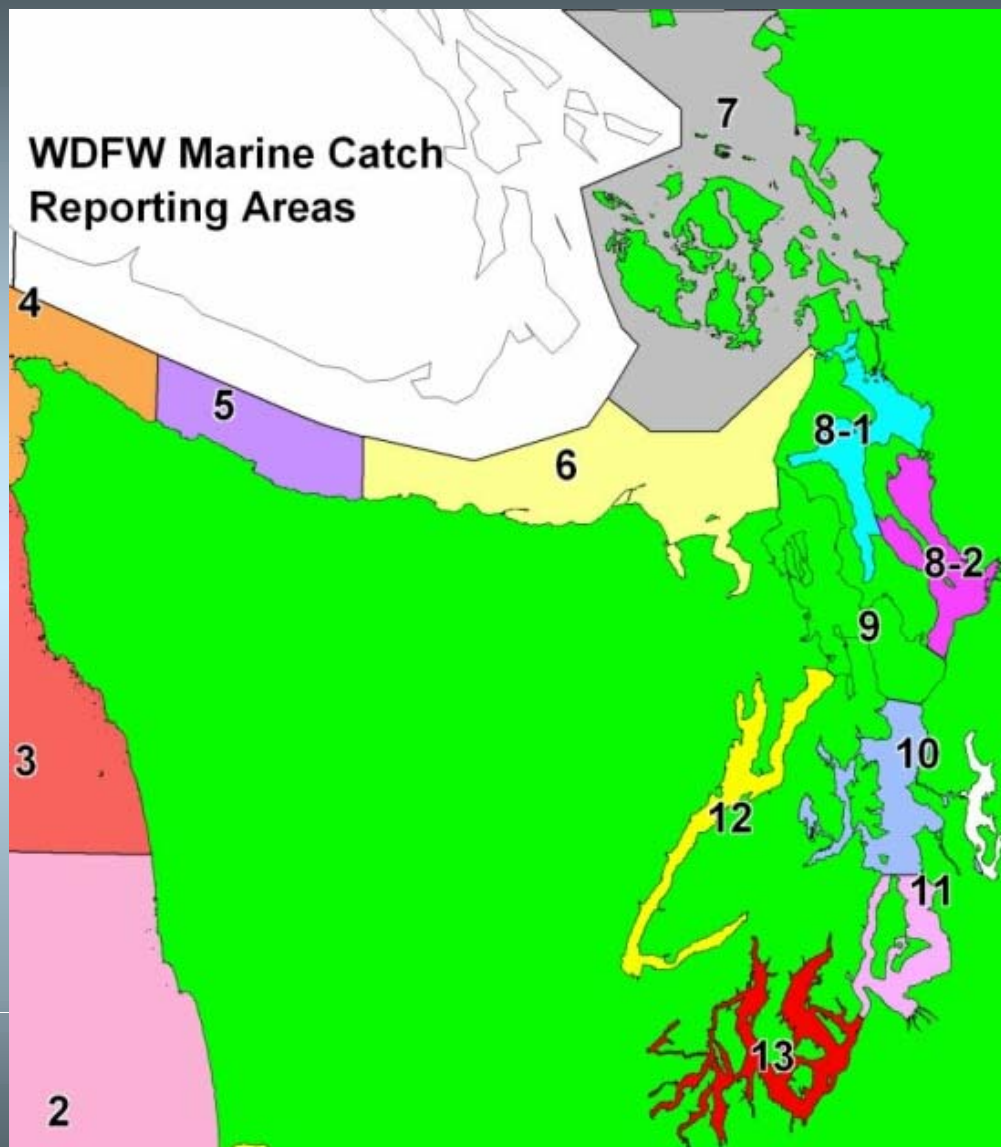
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WDFW Marine Catch Reporting Areas

Washington License System

➢ License types
- Freshwater
- Saltwater
- Shellfish
- Combination
- 2-Day Combination

➢ Not Required for anglers under 15 years of age

➢ Not Required to harvest Smelt

➢ WILD System
- Washington Interactive License Database
- Electronically captures angler contact information at the Point of Sale
- Few licenses issued outside of the Point of Sale system

Survey Methods

➢ Random sample of licensed saltwater anglers

➢ Conduct 1,000 phone interviews every 2 months

- Number of trips and trip specific data (Marine Catch Area, date, target species, launch site etc.)

- Response data; Number of contact attempts

➢ Determine percentage of unlicensed anglers during intercept sampling

Mean Trips per Angler

$$\overline{e}_{m,a} = \left(\frac{1}{n} \sum_{1=1}^{n} e_{i,m,a} \right)$$

$$V\hat{a}r(\overline{e}_{m,a}) = \frac{\left(\sum_{1=1}^{n} e_{i,m,a} - \overline{e}_{m,a} \right)^2}{n(n-1)}$$

Unlicensed Angler Adjustment

$$\hat{u} = \frac{1}{d} \sum_{i=1}^{d} \frac{anglers_i}{licensed\,.anglers_i}$$

$$V\hat{a}r(\hat{u}) = \left(\frac{D-d}{D} \right) \frac{\sum_{i=1}^{d} (u_i - \hat{u})^2}{d(d-1)}$$

Total Effort

$$\hat{E}_m = N\hat{u}\left(\frac{1}{n}\sum_{1=1}^{n}e_{i,m,a}\right) = N\hat{u}\overline{e}_{m,a}$$

$$\hat{Var}(\hat{E}_{m,a}) = N^2\{\hat{u}^2\hat{Var}(\overline{e}_{m,a}) + (\overline{e}_{m,a})^2\hat{Var}(\hat{u})$$
$$-\hat{Var}(\overline{e}_{m,a})\hat{Var}(\hat{u})\}$$

Assumptions

➢ Anglers accurately report the number (and type) of trips during the phone interviews.

➢ Unlicensed anglers have the same fishing effort as licensed anglers.

➢ WILD anglers contacted have the same average number of trips as those who are not contacted.

➢ No trips are taken on licenses issued outside the WILD Point-of-Sale system.

➢ Beach/Bank trips that target smelt do not catch any other species.

Survey Results

- Percentage of contacted anglers making trips
  - 5% in November-December to 42% July August
- Response rates
  - 53% to 63% response (of numbers attempted)
  - 10% refusals (of completed interviews)
  - 12% to 20% not available
  - 15% to 20% wrong number
- Percent Standard Error
  - Varies with MCA and Season
  - 10% to 27% Puget Sound; 18% to 100% by Sub-Area
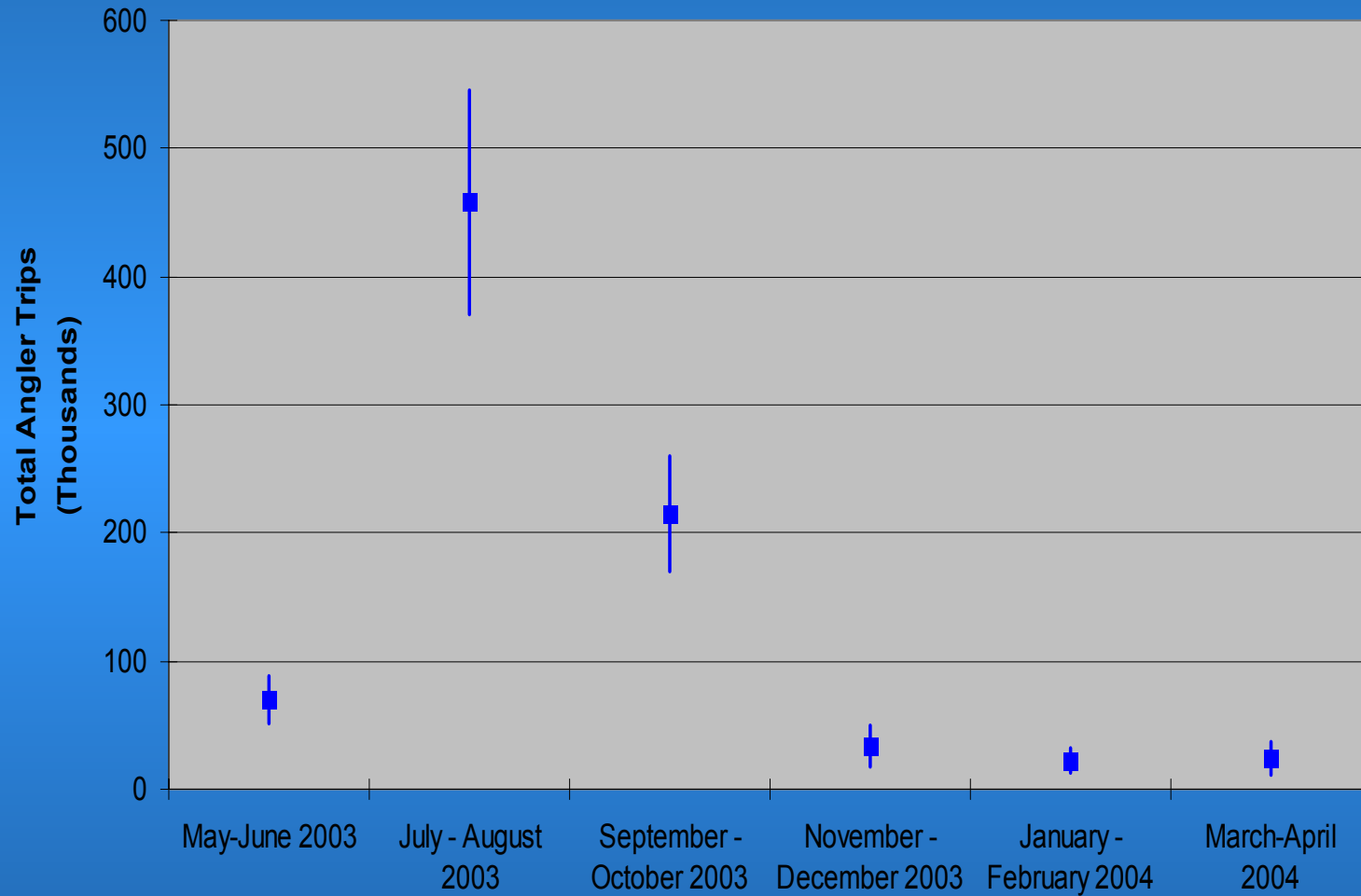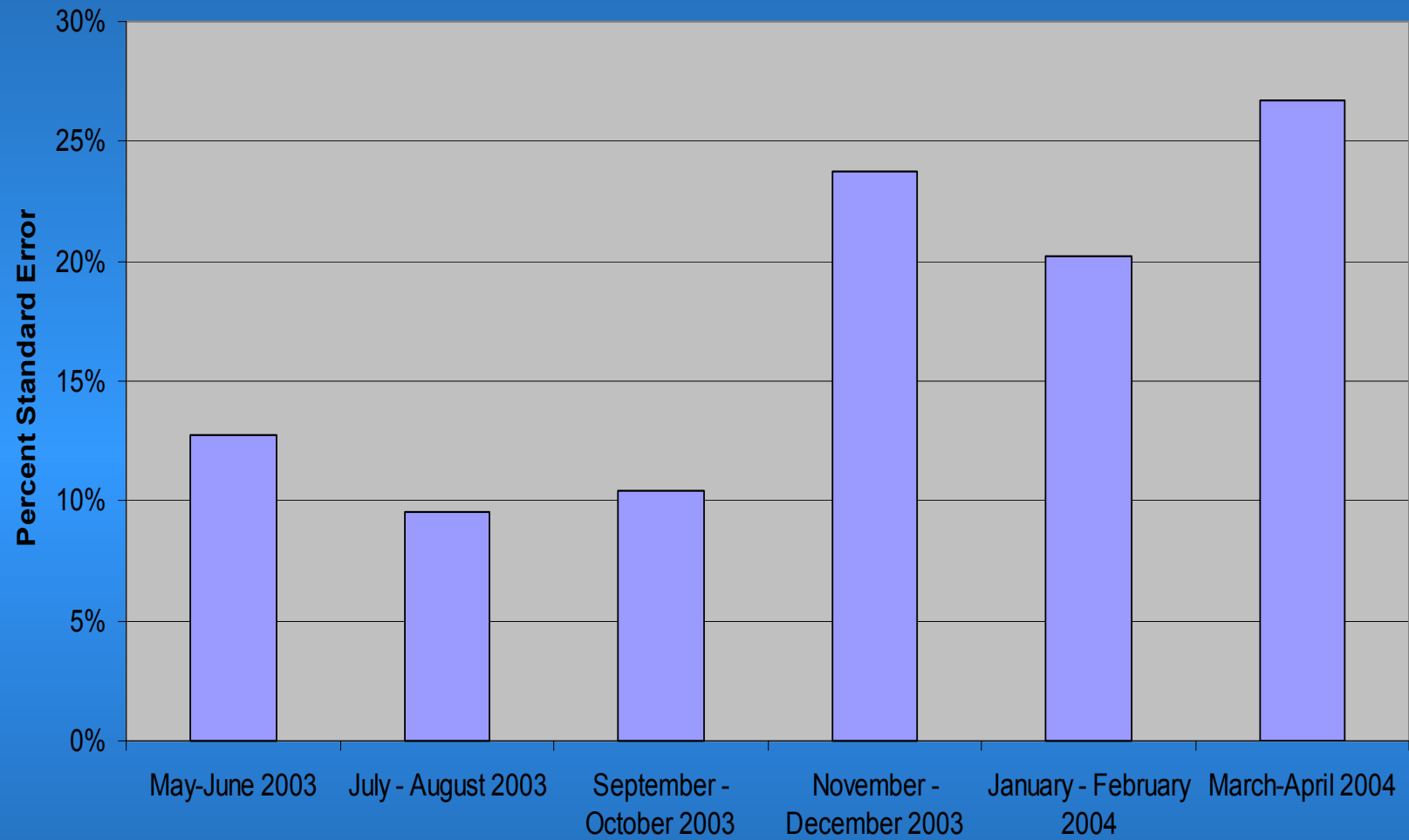
Summary

➤ In-season estimates for the sub-areas of Puget Sound are more precise

➤ Survey that targets the population of interest

- Include only marine anglers in the sample frame – efficient and unbiased

- WILD system makes this feasible – cost effective

➤ Data collected aids other sampling programs

- Independent assessment of anglers fishing habits

Reduction in Percent Standard Error Resulting from Removal of Non-Angling Contacts